

Biogeosciences Discuss., referee comment RC2
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Comment on bg-2021-268

Anonymous Referee #2

Referee comment on "Dynamics of rare earth elements and associated major and trace elements during Douglas-fir (*Pseudotsuga menziesii*) and European beech (*Fagus sylvatica* L.) litter degradation" by Alessandro Montemagno et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-268-RC2>, 2022

Manuscript Number: BG-2021-268

Title: Supplementary material for Dynamics of Rare Earth Elements and associated major cations during Douglas-fir (*Pseudotsuga menziesii*) and European beech (*Fagus sylvatica* L.) litter degradation.

Authors: Christophe Hissler, Alessandro Montemagno, Victor Bense, Adriaan J. Teuling, Johanna Ziebel, and Laurent Pfister

General comments

- The study aims to use the chemical signature of REE to better understand the decomposition rate of plant litter.
- I highly recommend normalizing the REE by the lower soil horizon or parent material or continental crust values. It is unusual to normalize by the dust since dust is typically a potential end member. All REE patterns should be reprocessed using a "true" regolith source. Dust can be transported from long distances, how can this be considered the sole parent material?
- Recommendation: Accepted after minor revision.

Abstract

- Write the abstract from the perspective of how the REE signatures inform the biogeochemical process involved on litter degradation. A more compelling story is the use of REE signatures as biogeochemical indicators of degradation steps. The abstract needs to be flipped from a different perspective. Let's say, I collect a sample from the O horizon and determine the REE signature, will this info reveal the stage of the organic matter decomposition. This is how reactive tracers are useful in future applications.
- Is there any difference on biogeochemical process under the two different type of litter? Are the REE signatures reflecting these differences? This was not mentioned in the abstract; however, since it is part of the title, I believe it should be relevant.

Lines 29-31: This type of statement needs to include the trend. What does a high or low ratio inform the degradation intensity?

Lines 31-33: The important implication here is how the white fungi activity influences organic matter degradation resulting in the Ce anomaly.

Introduction

- Well written introduction.

Lines 69-72: Add a reference citation.

Methods

- In Figure 1, the authors refer as humus material the fragmented litter. This is an incorrect definition of humus material. The thick brown or black substance that remains after most of the organic litter has decomposed is called humus. Humus material should be unrecognizable which is not the case in Figure 1. This material should be simply called partially fragmented litter not humus.
- Please justify why the digestion for the litter was different from the dust.
- What is the scientific rationale to use the local atmospheric deposition for normalization? Atmospheric dust should be treated as an end member. The dust can affect the REE signature. Is this normalization widely accepted in the literature? I highly recommend normalizing by the lower soil horizon or parent material or continental crust values. I question if the REE signatures are truly reflecting the decomposition of the litter or are biased by the dust normalization.

Line 180: Aqua Regia is not a total digestion method. Please clarify that this is a partial

digestion.

Section 2.3: Include information about the standards used in the calibration curve and the internal standard.

Section 2.4: Define the LREE, MREE, HREE

Results

Line 335: Specify, results are for the solid matrices.

Line 336: significant different... was this tested statistically? If not, how do you know is significant different?

Line 366/374: significant Eu/Ce positive anomalies... where are the statistics to support these statements?

Discussion

- It is confusing in some instances to follow if the discussion relates to the solid or leachates. Please make it clear across.

Lines 425-433: This reads as results descriptions. There are no implications associated to these descriptions.

Line 527: ... significant positive Ce anomalies... Where is the p-value?

Excellent representation in Figure 5.

Conclusion

- Well written summary.